Retaining Wall Block

Field of the Invention

1) The present invention relates to blocks used to form retaining walls and more particularly to a retaining wall block with a high coverage to weight ratio and positioning wedges and channels for rapid positioning of an upper block upon a lower tier of blocks in a retaining wall formed from said blocks.

Background of the Invention

2) Retaining walls are used to constrain earth embankments from sliding or falling and are commonly constructed from retaining wall blocks. The blocks typically have an interconnecting feature and are commonly stacked in tiers to the desired height to form the retaining wall. The tiers of blocks are often offset with respect to one another to form a retaining wall that is inclined from vertical with each successive upper tier stepped away from the adjacent lower tier.

3) Various blocks have been proposed for constructing retaining walls. One block is that shown in U.S. Patent 5,161,918 to Hodel (hereinafter the '918 patent), which discloses a block having a hole and pin arrangement for interlocking adjacent tiers of blocks in a set-back relation. The pins are rotatably adjustable to interlock the tiers in a straight configuration or in varying degrees of convex and concave configurations.

4) Another retaining wall block is that disclosed in U.S. Patent 4,909,010 to Gravier (hereinafter the '010 patent), which discloses a block with a stepped top surface. The

stepped top surface provides an interlock area to receive additional blocks thereon to create a retaining wall.

5) U.S. Patent 5,505,034 to Dueck (hereinafter the '034 patent) discloses a block for forming a retaining wall that includes an internal cavity and protruding knobs having a rounded surface. The rounded knobs are positioned for protruding into the internal cavity of at least one other block in a wall formed from the blocks and are adapted to abut the internal walls of the open cavity to position the block in the retaining wall.

6) Although the aforementioned patents disclose blocks having features useful for forming a retaining wall, they are not optimal. The hole and pin arrangement of the '918 patent requires the manufacture of pins separate of the blocks which adds to the cost of the retaining wall. Additionally, for each block fitted into the wall, the pins must be set in place and rotated to the correct orientation to create the desired wall configuration.

7) The interlocking system of the '010 patent, as a result of the outer front edges of an upper block contacting the interlocking step in the top surface of a lower row of blocks, is better suited to the construction of straight retaining walls. When used to construct a curved retaining wall the blocks of the '010 patent contact the lower tier of blocks on their outer bottom edges, which causes a large gap to form between the lower front edge of the block in an upper tier of blocks and the front lip of the blocks in the lower tier. This gap will widen and become excessive as the curved retaining wall is built higher, as the radius of curvature decreases with each successive layer.

8) Forming a curved wall with the single cavity block of the '034 patent requires the installer to break off two frangible extensions, which being a part of the original block detracts from the coverage to weight ratio of the block. A disadvantage of the single

cavity block of the '034 patent is that the frangible extensions extend to a line perpendicular to the front face of the bloc, requiring the installer to break off the two frangible extensions when forming a curved wall. Including the frangible extensions decreases the coverage to weight ratio for a portion that eventually will be removed and discarded in the construction of a curved retaining wall, adding to wastage of material. Additionally, the top surface of a block according to the '034 patent is flat, therefore not allowing a block placed on top of a lower tier to be slid between adjacent cavities without first lifting the block to elevate the projecting means above the side walls of the blocks in the lower tier.

9) The retaining wall block of the present invention includes sharply diverging side walls and wings that extent substantially less than a plane tangent to the front corner and perpendicular to the front face of the block. This block geometry enables construction of either a straight or curved retaining wall without requiring any portion of the blocks to be broken away, thereby decreasing wastage and increasing the coverage to weight ratio of the blocks. The block of the present invention also includes channels formed in the top surface of the blocks, thereby allowing a block in a straight wall to be repositioned without requiring it to be lifted to clear the side walls of the blocks in the lower tier.

10) The block of the present invention therefore simplifies construction of a retaining wall by decreasing the weight of the block for a given coverage area and by virtue of the channels in the top surface making it easier for the block to be repositioned.

11) These, and other advantages will be apparent to a person skilled in the art by reading the attached description along with reference to the attached drawings.

Summary of the Invention

12) According to the present invention, a block is provided for use in constructing a retaining wall. The block comprises a body having a central cavity extending vertically there through and defining front, rear, and side walls. The side walls diverge rearwardly from the front of the block to the rear. Stabilizing wings extending outwardly at the rear of the side walls. Positioning wedges extend from the bottom surface and include flat forward surfaces for positioning the block with respect to the blocks in a lower tier of blocks. The flat forward surfaces of the positioning wedges are located nearer the front surface of the block than is the inner surface of the front wall, thereby enabling a retaining wall created from the blocks to have each successive higher tier offset from the adjacent lower tier by a set distance. The block of the present invention provides a stable block having a large coverage area at a low weight.

Description of the Drawings

13) Fig. 1 is a bottom view of a preferred embodiment of a retaining wall block according to the present invention.

14) Fig. 2 is a front view of the retaining wall block of Fig. 1.

15) Fig. 3 is a side view of the retaining wall block of Fig. 1.

16) Fig. 4 is a bottom view of the retaining wall block of Fig. 1.

17) Fig. 5 is a top perspective view of the retaining wall block of Fig. 1.

18) Fig. 6 is a bottom perspective view of the retaining wall block of Fig. 1.

19) Fig. 7 is a perspective view of a straight retaining wall constructed with retaining wall blocks according to the present invention.

20) Fig. 8 is a side conceptual view of a retaining wall constructed with retaining wall blocks according to the present invention.

21) Fig. 9 is a bottom view of a portion of a straight retaining wall depicting two blocks in a lower tier overlaid by a single block in an upper tier.

22) Fig. 10 is a bottom view of a portion of a curved retaining wall depicting two blocks in a lower tier overlaid by a single block in an upper tier.

Table of Nomenclature

23) The following is a listing of part numbers used in the drawings along with a brief description:

Part Number	Description
20	retaining wall block
22	body
24	front surface
26	rear surface
28	bottom surface
30	top surface

32	side surface
34	central cavity
36	front wall
38	rear wall
40	side wall
42	front inner wall surface
44	side inner wall surface
46	front corner
48	stabilizing wing
49	rear surface of stabilizing wing
50	plane tangent to front corner and perpendicular to front face
52	positioning wedge
54	flat forward surface of positioning wedge
56	channel
58	vertical portion of front surface
60	beveled portion of front surface
62	flat forward edge of channel
64	interior side wall portion of positioning wedge
66	exterior side wall portion of positioning wedge
68	straight retaining wall
70	lower tier of blocks
72	upper tier of blocks
73	granular drainage rock
74	drainage pipe
75	forward wall face
76	block in lower tier
78	block in upper tier
80	rearward extent of channel
82	forward extent of channel
84	curved retaining wall

Detailed Description

24) Referring to Figs. 1-4 there are depicted three views of a preferred embodiment of a retaining wall block 20 according to the present invention. The retaining wall block 20 includes a body 22 having a front 24, rear 26, bottom 28, top 30, and side 32 surfaces. A central cavity 34 extends vertically through the body 22 thereby defining a front 36, rear 38, and side 40 walls. Each of the walls has an inner surface, including a front inner wall surface 42 and side inner wall surfaces 44.

25) The block 20 includes front corners 46 are located at the intersection of each of the side walls 40 and the front wall 36. As shown in Figs. 1 and 4, the side walls 40 diverge rearwardly from the front corner 46 of the block 20. A stabilizing wing 48 extends outwardly from each of the side walls 40 adjacent the rear surface 26. The stabilizing wings 48 have rear surfaces 49 coplanar with the rear surface 26 of the block. As denoted by the distance *a* in Figs. 1 and 4, each of the wings extends substantially less than the plane 50 tangent to the front corner 46 and perpendicular to the front surface 24. The side walls 40 diverge rearwardly from the front surface 24 preferably at an angle of 20 degrees or greater from the plane perpendicular to the front surface. In a most preferred embodiment, the side walls diverge rearwardly from the front surface at an angle of 27 degrees (θ in Fig. 1) from perpendicular with the front surface.

26) With reference to Figs. 2-4, two positioning wedges 52 extend from the bottom surface 28 and include flat forward surfaces 54. The flat forward surface 54 of each positioning wedge 52 is located nearer the front surface 24, designated by the distance *b* in Fig. 3, than is the front inner wall surface 42. The retaining wall block 20 includes channels 56 on the top surface 30 extending a first depth *c* into each of the side walls 40. The front surface 24 of the retaining wall block 20 includes a vertical portion 58 extending from the bottom surface 28 and a beveled portion 60 extending from the vertical portion 58 to the top surface 30. With reference to Fig. 3, the beveled portion 60 extends laterally to the vertical portion 58 by a second distance *d*, which is preferably equal to the distance *b*. Referring to Figs. 3 and 5, the channels 56 in the top surface 30 include flat forward edges 62 that are coplanar with the front inner wall surface 42. The flat forward surface 54 of the positioning wedges 52 are positioned nearer the front

surface 24 of the block 20 than the flat forward edge 62 of the channel 56 and the front inner wall surface 42.

27) With reference to Figs. 2-4 and 6, the positioning wedges 52 extend laterally from the side inner wall surface 44 of the block 20 to the side surface 32 of the block. The positioning wedges 52 include an interior side wall portion 64 that is coplanar with the side inner wall surface 44 and an exterior side wall portion 66 coplanar with the side surface 32. As shown in Fig. 4, the positioning wedges 52 are substantially rectangular shaped.

28) The retaining wall block of the present invention can be used to construct a retaining wall such as the straight retaining wall 68 shown in Fig. 8. Although a retaining wall with four tiers are shown, principles of construction of the wall will be explained by reference to two of the tiers 70, 72. As a result of the flat forward surface 54 of the positioning wedges 52 being positioned nearer the front surface 24 of the block 20 than the flat forward edge 62 of the channel 56 and the front inner wall surface 42, construction of a retaining wall by stacking blocks in tiers, such as the lower tier 70 and upper tier 72 shown in Fig. 8, positions the front surface 24 in an upper tier 72 of blocks the distance *b* (shown in Fig. 3) behind the front surface of the lower tier 70 of blocks. Prior to forming the retaining wall 68, granular drainage rock 73 is used to form a bed under the retaining wall 68 and usually is used to cover half of the lower tier 70 as shown. To facilitate rapid drainage of water, a drainage pipe 74 is typically positioned behind the retaining wall 68 as shown and covered with granular drainage rock 73.

29) With reference to Figs. 7 and 8, the retaining wall 68 is constructed by stacking blocks 20 in successive tiers. A plurality of blocks 20 are formed into the retaining wall

68 by placing a lower tier 70 of blocks with the blocks 20 in the lower tier 70 in contact at the front corners 46. An upper tier 72 of blocks is then formed by placing the flat forward surfaces 54 of the positioning wedges 52 of the blocks of the upper tier 72 in engagement with the front inner wall surface 42 of one or more of the blocks in the lower tier 70. The blocks in the upper tier 72 are positioned by placing blocks 20 upon the lower tier 70 and sliding them forward until the flat forward surface 54 of the positioning wedges 52 contact the front inner wall surface 42 of one or more blocks 20 in the lower tier 70 of blocks. The blocks 20 are dimensioned such that the channels 56 extending the first depth *c* (see Fig. 3) into each of the side walls 40 on the top surface 30 of the blocks 20 in the lower tier 70 accommodate the positioning wedges 52 extending from the bottom surface 28 of the blocks 20 in the upper tier 72. A straight retaining wall 68 constructed with the retaining wall blocks 20 according to the present invention therefore presents a retaining wall with a forward wall face 75 that includes a series of vertical 58 and beveled 60 surfaces.

30) Referring to Fig. 9, a bottom view is shown of a portion of a straight retaining wall 68 depicting two blocks 76 in a lower tier 70 overlaid by a single block 78 in an upper tier 72. To form the straight retaining wall 68, the blocks 76 are arranged end to end in a straight row with the front corners 46 in contact to form the lower tier 70. A block 78 is then placed on top of the lower tier 70 with the positioning wedges 52 placed in the central cavities 34 of the blocks 76 in the lower tier 70. The upper block 78 is then centered over the two lower blocks 76. The rearward extent 80 of the channels 56 on the opposite side of the lower blocks 76 is shown by the broken lines on the side walls 40. It should be apparent that one advantage of the present retaining wall block is that the

channels 56 allow the upper block 78 to be slid laterally across the lower blocks 76 to reposition the upper block 78 as desired. In case an upper block 78 must be moved across several lower blocks 76, the channels 56 in the top surface of the lower blocks 76 provide openings to allow passage of the positioning wedges 52 there through. This feature makes it easy to reposition blocks during construction of the wall as desired. The channels in the top surface of a lower tier 70 of blocks in the straight retaining wall 68, whose rearward 80 and forward 82 extents are indicated by the broken lines, therefore provide openings for passage of the positioning wedges 52 in the bottom surface 28 of an upper tier 72 of blocks when a block 78 of the upper tier 72 of blocks is slidingly moved with respect to the lower tier 70 of blocks. The stabilizing wings 48 of the upper block 78 rest partially on the stabilizing wings 48 of the lower blocks 76, thereby stabilizing the retaining wall.

31) Referring to Fig. 10, a bottom view is shown of a portion of a curved retaining wall 84 depicting two blocks 76 in a lower tier 70 overlaid by a single block 78 in an upper tier 72. To form the curved retaining wall 84, the blocks 76 are arranged with the front corners 46 in contact and at the desired angle θ to form the lower tier 70. A block 78 is then placed on top of the lower tier 70 with the positioning wedges 52 placed in the central cavities 34 of the blocks 76 in the lower tier 70. The upper block 78 is then centered over the two lower blocks 76. The stabilizing wings 48 of the upper block 78 rest partially on the stabilizing wings 48 of the lower blocks 76, thereby stabilizing the curved retaining wall 84.

32) Referring to Figs. 3 and 8, the flat forward surface 54 of each positioning wedge 52 is located nearer the front surface 24, designated by the distance *b* in Fig. 3, than is the front inner wall surface 42. Therefore stacking blocks in tiers vertically, with the flat

forward surface 54 of the positioning wedges 52 of an upper block in engagement against the front inner wall surface 42 of a lower block, creates a retaining wall with a setback equal to the distance *b*. In a most preferred embodiment of the retaining wall block of the present invention, the face dimensions of the block are preferably 8 inches tall by 18 inches long (see Fig. 2). The depth of the block 20, or the distance across the block from the front 24 to the rear 26 surface, is preferably 11.8 inches. A most preferred dimension for the distance between the flat forward edge 62 of the channel 56 and the flat forward surface 54 of the positioning wedge 52 is 0.75 inch, thereby creating a setback distance of 0.75 inch between successive tiers of blocks. With a setback distance of 0.75 inch, the retaining wall 68 of Fig. 8 would have a 6 degree setback, which would be the angle from vertical if a straightedge were placed vertically along the face of the retaining wall in Fig. 8. A block 20 according to the preferred embodiment of this invention, would typically have a nominal weight of 63 pounds. Thus, with a face dimension of 8 inches tall by 18 inches long, the preferred embodiment of a retaining wall block according to the present invention would provide a coverage of 144 square inches per block at a weight of 63 pounds, or a coverage to weight ration of 2.29 square inches per pound of block. The high coverage to weight ratio provides a low cost block per area of coverage and is easier to install and lift as a result of its lower weight per unit.

33) As the invention has been described, it will be apparent to those skilled in the art that the same may be varied in many ways without departing from the spirit and scope of the invention. Any and all such modifications are intended to be included within the scope of the appended claims.